

Effect of bovine lactoferrin on antibody responses in *E. coli* O157:H7 infected cattle.

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INTRODUCTION

Enterohaemorrhagic *Escherichia coli* (EHEC), like *E. coli* O157:H7, are major food-borne pathogens resulting in severe disease in humans worldwide [1]. Ruminants are the main reservoir of EHEC and do not show clinical symptoms. The specific mechanisms for the persistence in ruminants are unclear and there is no efficient strategy available to clear the infection. In this study, the treatment of EHEC infected calves with lactoferrin (bLF), an antimicrobial and immune modulating protein, was investigated as a possible future strategy for reducing shedding of EHEC by ruminants. Other studies have shown that animals infected with EHEC develop serum responses against type 3 secretion system (T3SS) proteins of EHEC but this response is not protective against a second infection [2]. In this study we focused on the effect of bLF on the antibody responses of infected animals.

MATERIAL AND METHODS

Nine calves, seronegative for antibodies against intimin, EspA, and EspB (T3SS proteins), were orally inoculated with 10¹⁰ CFU of *E. coli* (strain NCTC12900) for 2 consecutive days and were reinfected with the same dose one week later. The oral group (n=3) received 3g bLF/day, while the rectal group (n=3) was treated with 300mg bLF/day rectally. The control group (n=3) received PBS. Faecal sampling was performed every 3 days to determine bacterial shedding, serum was collected weekly for monitoring the antibody response.

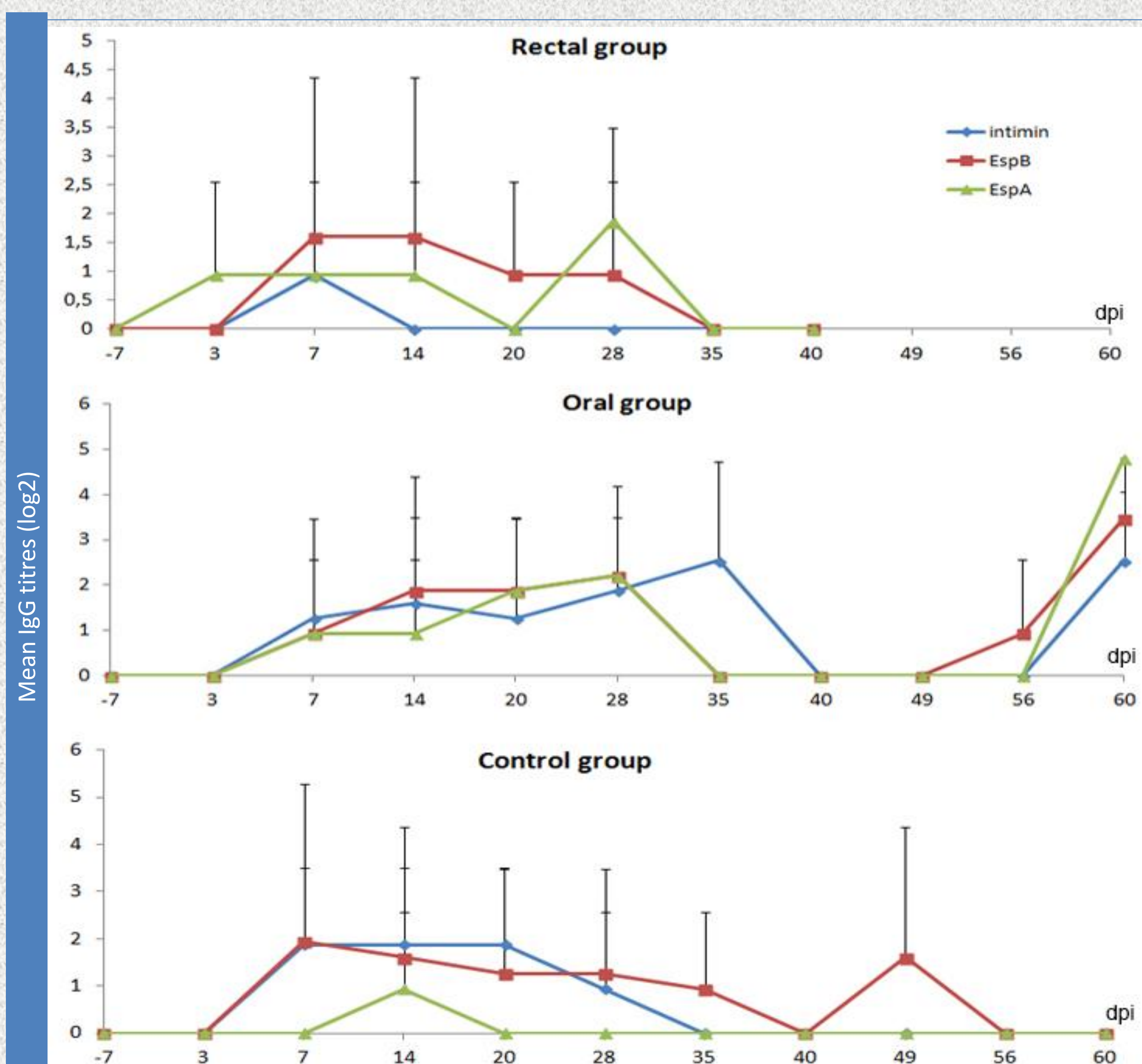


Fig 1. Average specific IgG serum antibody responses against EspB, EspA and intimin after infection of calves with *E. coli* O157:H7 with and without lactoferrin treatment. Values are average log₂ values.

RESULTS

The rectal bLF treatment group ceased shedding after 26 days. The oral treatment did not affect shedding since these animals were still shedding at the end of the experiment (d54), similar to the controls. The treatment did not change the intimin-specific IgM and IgA response. Rectal and control groups showed a strong and early EspB-specific IgM and IgA response, whereas the early intimin-specific IgG response was higher in the control group. The early EspB-specific IgG response was high in the control and rectal group. The oral bLF group showed a strong IgG response against EspA, EspB, and intimin at the end of the trial. These results indicate a beneficial effect of bLF against EHEC infections in cattle.

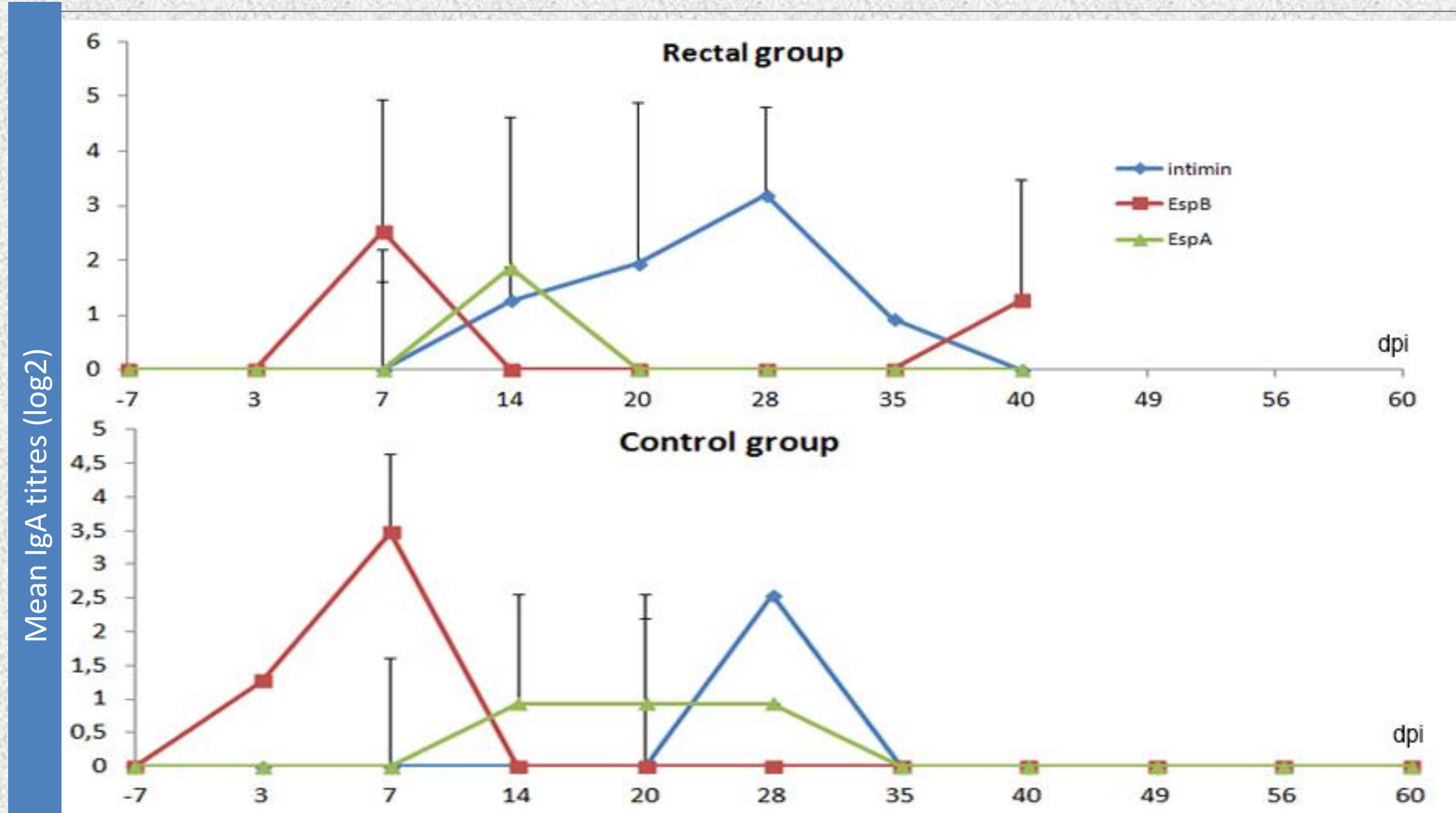


Fig 2. Average specific IgA serum antibody responses against EspB, EspA and intimin after infection of calves with *E. coli* O157:H7 with and without lactoferrin treatment. Values are average log₂ values.

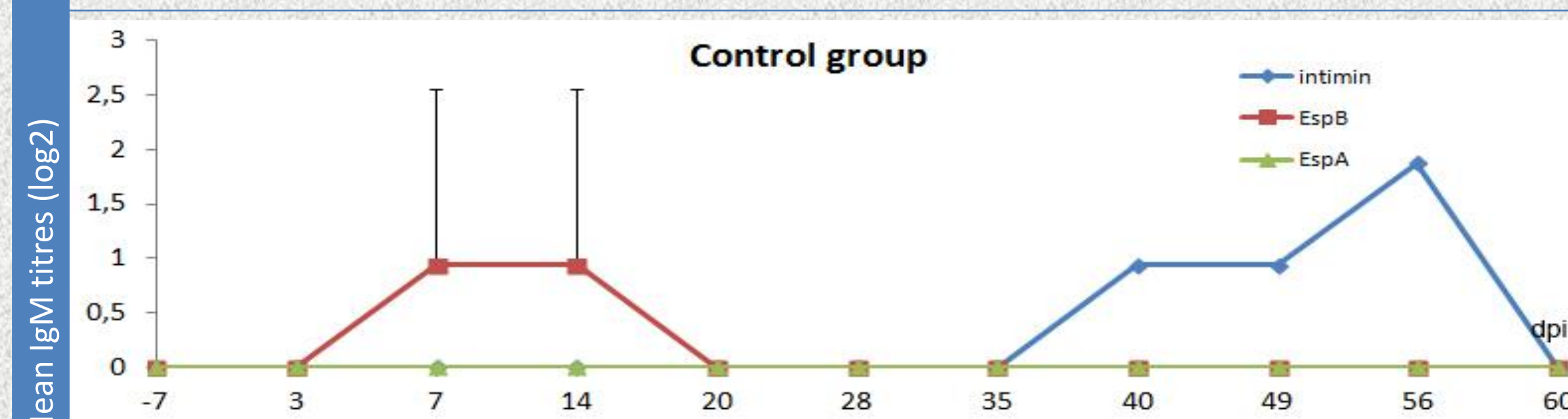


Fig 3. Average specific IgM serum antibody responses against EspB, EspA and intimin after infection of calves with *E. coli* O157:H7 without lactoferrin treatment. Values are average log₂ values.

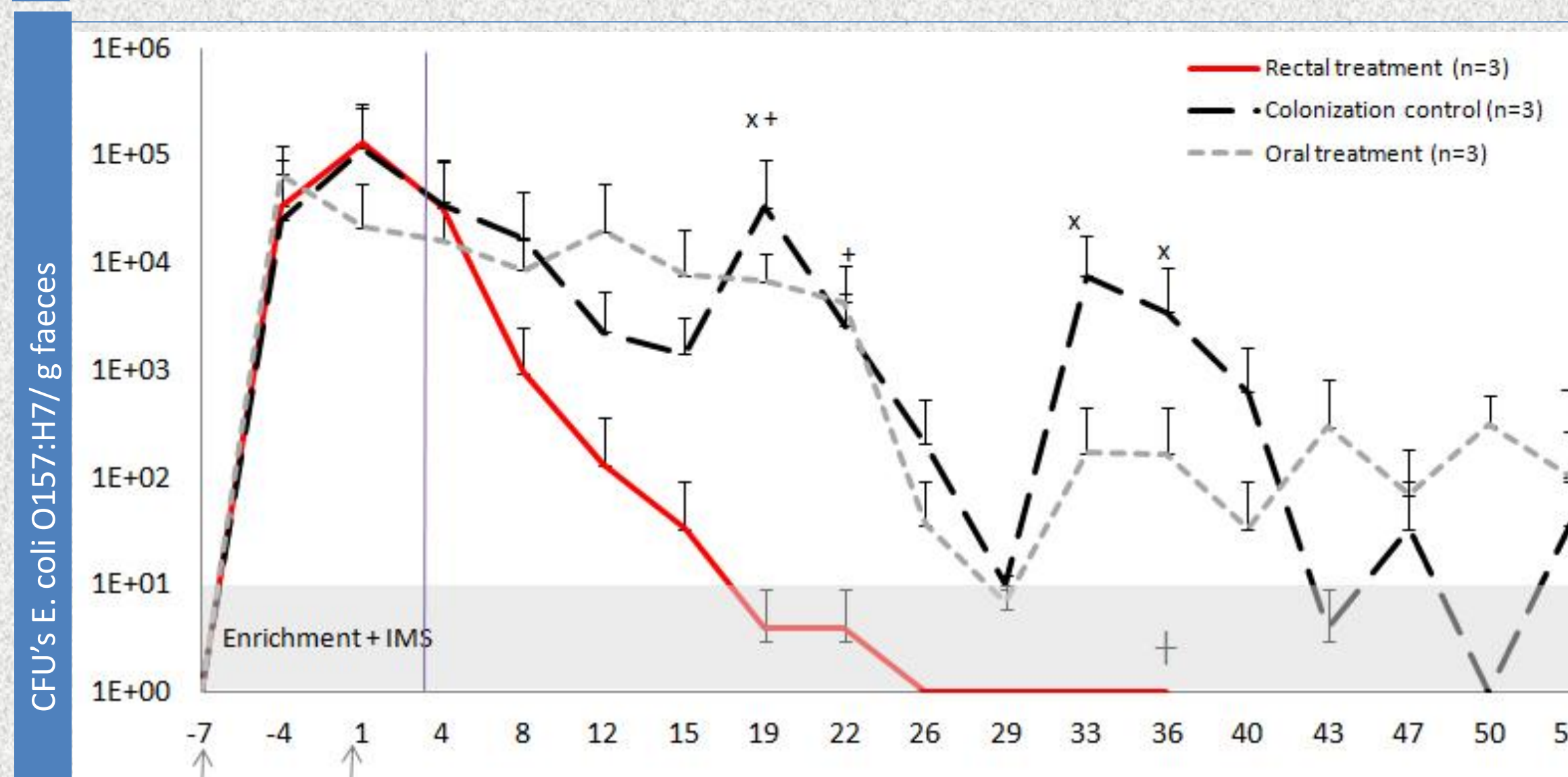


Fig 4. Average *E. coli* O157:H7 excretion following infection, oral and rectal bLF treatment of calves. x : significant differences in bacteria excretion between control and rectal treatment groups, +: significant differences in bacteria excretion between oral and rectal treatment groups, † euthanasia.

DISCUSSION & CONCLUSIONS

This and previous studies performed by our group, have shown that *E. coli* O157:H7 infected cattle have benefits from a curative bLF treatment. Therefore, bLF could be useful to decrease the colonization pressure at farm level and so prevent contamination of food by EHEC. Since IgG responses against EspB are generally high [3], this protein could be an interesting tool for screening and diagnosis of EHEC positive animals.